

AK

**Notice of Allowability**

Application No.

10/602,721

Examiner

Eugene Lee

Applicant(s)

MOULI ET AL.

Art Unit

2815

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 9/27/05.
2. ☒ The allowed claim(s) is/are 1-10, 12-33, 35-37 and 59-65.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).


\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

  
EUGENE LEE  
AU 2815

## DETAILED ACTION

### *Allowable Subject Matter*

1. Claims 1 thru 10, 12 thru 33, 35 thru 37, and 59 thru 65 are allowed.
2. The following is an examiner's statement of reasons for allowance: The references of record, either singularly or in combination, do not teach or suggest at least a **pixel cell** comprising: a gate of a transistor formed at least partially **below** a surface of the substrate, the gate having a bottom surface below the surface of the substrate; a **photo-conversion device** formed **adjacent** to the gate, a doped surface layer of a first conductivity type, and a doped region of a second conductivity type underlying the doped surface layer, wherein the **second conductivity type layer is at a level below the level of the bottom surface of the gate**.  
Fossum 5,055,900 discloses a gate below a surface of the substrate, and a doped surface layer of a first conductivity type, however, Fossum does not disclose the second conductivity type layer (which is underlying the doped surface layer) wherein the second conductivity type layer is at a level below the level of the bottom surface of the gate (claims 1-10, and 12-19).

Regarding claims 20-23, the references of record, either singularly or in combination, do not teach or suggest at least a **pixel cell** comprising: a trench in the substrate; a gate of a transistor at least partially in the trench; a **photo-conversion device** formed **adjacent** to the gate, a doped surface layer of a first conductivity type below the surface of the substrate, and a doped region of a second conductivity type underlying the doped surface layer of a first conductivity type, wherein the **second conductivity type layer is at a level below the level of the bottom surface of the gate**.

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Regarding claims 24-33, and 35-37, the references of record, either singularly or in combination, do not teach or suggest at least an imager system comprising: a pixel comprising: a gate of a transistor formed at least partially **below** a surface of the substrate, the gate having a bottom surface below the surface of the substrate; a **photo-conversion device** formed **adjacent** to the gate, a doped surface layer of a first conductivity type, and a doped region of a second conductivity type underlying the doped surface layer, wherein the **second conductivity type layer is at a level below the level of the bottom surface of the gate.**

Regarding claims 59-65, the references of record, either singularly or in combination, do not teach or suggest at least a pixel cell comprising: a trench; a gate of a transistor formed in the trench, the gate having a bottom surface below the surface of the substrate; a **photo-conversion device** formed **adjacent** to the gate, a doped surface layer of a first conductivity type, and a doped region of a second conductivity type underlying the doped surface layer, wherein the **second conductivity type layer is at a level below the level of the bottom surface of the gate.**

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### INFORMATION ON HOW TO CONTACT THE USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee  
June 20, 2005



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REPLACEMENT SHEET

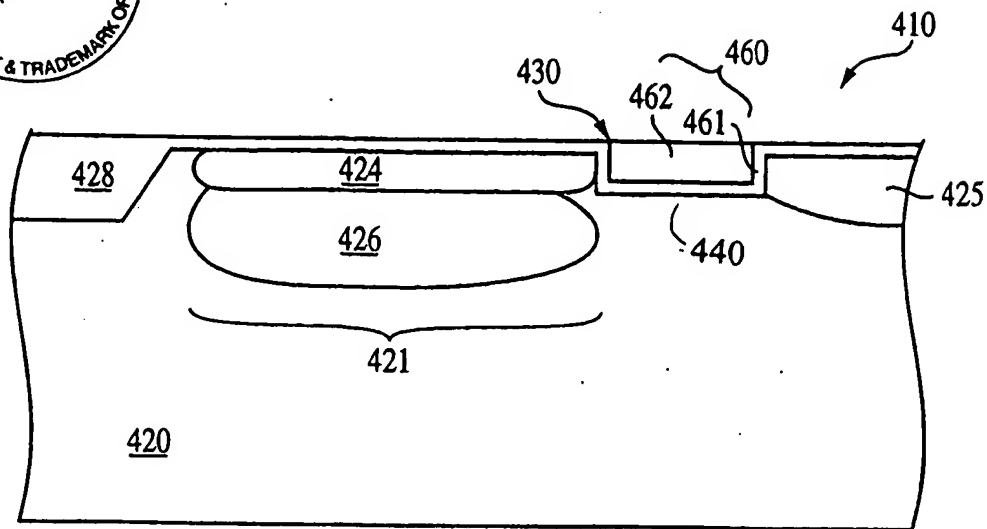


FIG. 4

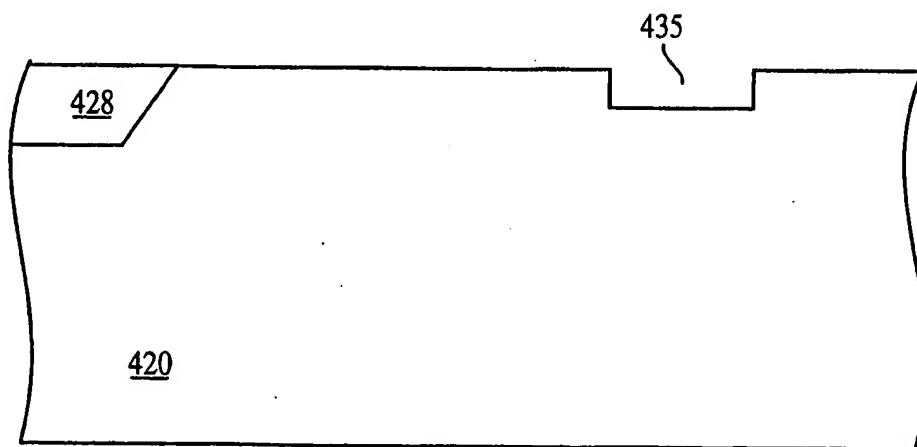


FIG. 5A

OK  
11/20/05